

GEOPHYSICAL VARIABLES AND BEHAVIOR: VII. PREDICTION OF RECENT EUROPEAN UFO REPORT YEARS BY NINETEENTH CENTURY LUMINOSITY AND SOLAR-SEISMIC MEASURES

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Summary.—Discriminant analyses were used to determine optimal solar and seismic variables that could correctly classify years in which major luminous events had been reported within Germany, Italy, Austria, France, and Switzerland between the years 1849 and 1926. Expected discriminant scores were generated from these functions for the years 1820 to 1971. Functions that accurately classified more than 90% of the luminosity events between the years 1870 and 1905 also accurately predicted the major UFO flaps between 1945 to 1971 in this area. These analyses support the contention that luminous events reported in the nineteenth century share the same source of variance as modern UFO reports and these phenomena are associated with tectonic strain within the earth.

If most UFO-like luminosities are associated with some process generated by structural strain within the earth (Persinger, 1976, 1979, 1981), then these events should have been reported long before the year 1947. Although their occurrence may have been masked by the popular labels of the period, luminosities should have been correlated with seismic activity then as they are now (Persinger, 1980, 1981).

The capacity to predict UFO (unidentified flying object) reports for a contemporary period by a function generated from seismic data collected during a different era would support two important extrapolations of the hypothesis. First, it would affirm the geophysical bases of these reports. Second, such prediction would strongly support the contention that there is little difference between the events labeled as "odd meteors or luminosities" then and the events called UFOs now.

To test this possibility the numbers of odd luminosities (TLUM) reported within Germany, Italy, France, Austria, and Switzerland between the years 1820 and 1920 were sorted from the master file (Persinger & Lafrenière, 1977). Three types of luminous reports were differentiated: (1) odd balls of light not associated with recorded earthquakes (LUMP), light displays at the times of earthquakes (LUMQ), and very odd displays (ODDP).

All data had been reported by Charles Fort (1974) and were field observations published in scientific journals or newsletters. (Unlike most contemporary UFO reports, historical luminosity reports involved major displays.)

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Whereas the LUMQ events included descriptions such as "flame-like fires seen in sky several hours before an earth quake" ODDP descriptions involved various accounts of "phantom armies" or "objects with moving wings" in the sky. A typical LUMP report was "Upon August 1, 1871, an unknown luminous object was seen in the sky of Marseilles, by Coggia (*Comptes. Rendu*, 73-398). According to the description, it was a magnificent red object. It appeared at 10:43 Pm. and moved eastward, slowly, until 10:52:30. It stopped—moved northward again, at 10:59:30 was stationary. It turned eastward again, and, at 11:03:20, disappeared or fell behind the horizon" (Fort, 1974, p. 403).

Considering the relatively small number of luminosity reports, the selected interval of analyses was 1 yr. Total numbers of IV-V (SMALLQ), VI, and VII-IX (LARGEQ) intensity earthquakes per year were obtained from the Mayer-Rosa file (magnetic tape from the U.S. Department of Commerce) for the years 1800 to 1971 (end of file). Mean yearly sunspot numbers (Zurich) were obtained from Chernosky and Hagan (1958) for the years 1820 to 1957 and from the *Journal of Geophysical Research* for the remaining period. Two variables were calculated: the square root of the mean yearly sunspot number (SQSUN) and the percent change (SSQCH) in SQSUN from the previous year.

Three periods, 1850 to 1925, 1860 to 1915, and 1870 to 1905, were selected for analyses. These intervals were used to test the reliability of the variables that entered the predictions and to determine the effect, if any, of the autocorrelation noted in the longest period. For example, the sequence (SEGNUM) correlations between SMALLQ and years for the three periods were 0.45, 0.33, and 0.08, respectively. Whether these trends reflected a true alteration in earthquake activity or an alteration of detection sensitivity is not clear.

The total numbers of different events for quake and UFO measures for the 1850 to 1925 ($n = 76$) period were SMALLQ (791), QVI (70), LARGEQ (27), LUMT (40), LUMQ (13), LUMP (11) and ODDP (16) and 404, 40, 14, 26, 8, 9, and 9, respectively, for the smallest period ($n = 36$). Since skewness values exceeded 2.00 for the earthquake numbers, variables composed of the square root values of these measures were also generated. The means and standard deviations for SQSUN and SSQCH for the longest period were 5.90 ± 2.57 and 7.99 ± 50.41 , respectively, and 5.83 ± 2.72 and 6.65 ± 43.45 for the shortest period.

The primary analytical procedure was step-wise (Rao's method; maxsteps = 7) discriminant analyses (SPSS: DISCRIMINANT). All solar and seismic variables were lagged from 1 to 6 yr. The luminosity variables were not lagged or lagged 3 yr. to test two models, prediction and explanation. In the prediction model contemporary and lagged (or lagged only) solar-seismic variables were allowed to enter. To evaluate the explanation model the lag 3 variable of each luminosity measure was used instead. For the solar-seismic variables this operation meant that lags 4 to 6 involved years before the luminous events while lags 0 to 2 involved years after the events (the contemporary year = lag 3).

For each luminosity category, two discriminant sets were involved. The first set involved comparisons of all no report years with years registering at

least one report (0, 1). The second series included a comparison of years with no reports, one or two reports and three or more reports (0, 1, 2). Although the latter type of year was not very frequent, the analysis was completed to determine if very high frequency luminosity years were associated with markedly different variables. For example, the number of years with reports during the 1870 to 1905 period for TLUMO was 13. All analyses were completed on a DECSYSTEM-20 computer.

The general pattern of the analyses indicated that the same variable matrix entered for the different luminosity categories for a given period and set. Consequently, the remaining discussion primarily involves the TLUMO classification only. In addition, the explanation model (the temporally symmetrical procedure of ± 3 -yr. entries) systematically accommodated 5 to 8% more of the variance than the prediction model. With seven variables in a function (maxsteps = 7), Wilks' lambdas averaged 0.70, 0.65, and 0.55 for the 1850-1925, 1860-1915, and 1870-1905 periods, respectively.

Although acceptance criteria were based upon statistical standards and the accuracy of classification, greater preference was given to functions that tended to classify luminosity years maximally rather than nonluminosity years. This decision was based upon the assumption that failure to classify accurately the negative years would be more contaminated by a failure of observation or report.

One sample moderate function involving square root variables and selected from the shortest interval was: $TLUMO = [(0.99 \times SQSMAL2) + (0.19 \times SSQCH) - (0.45 \times SQSMAL) + (0.02 \times SSQCH3) + (0.22 \times QSUN6) + (0.89 \times SQLARGEQ) - (0.70 \times SQQV14) - 2.85]$. This function demonstrated the following characteristics: canonical correlation: 0.71, Wilks' lambda (0.50), chi-squared: 28.14 ($p < .001$), Box's M : 3.80 ($p > .05$), and 89% correct classification of cases. A comparison of the expected discriminant scores (calculated independently from the above function) and the observed values are shown in Fig. 1.

As a test for the accuracy of the function for years not involved with its derivation, the number of TLUMO years before 1870 and after 1905 are also shown. The most conspicuous misses occurred for the year 1829 and for the infamous "airship" episode of 1908. The over-all accurate classification still remained above 85%. (Interestingly the most statistically significant function generated from the LUMP only cases with *raw* solar-seismic data for that period did predict the 1908 event as well as all the major events after 1946.)

The critical test for the function can be seen in Fig. 1 for the years 1926 to 1971. Although there was an hiatus of luminous reports (Fort's collection stops in the 1920s) between 1925 and 1945, the 1930 peaks were associated with a relatively unknown "odd airship cluster" (Keel, 1970). The predicted

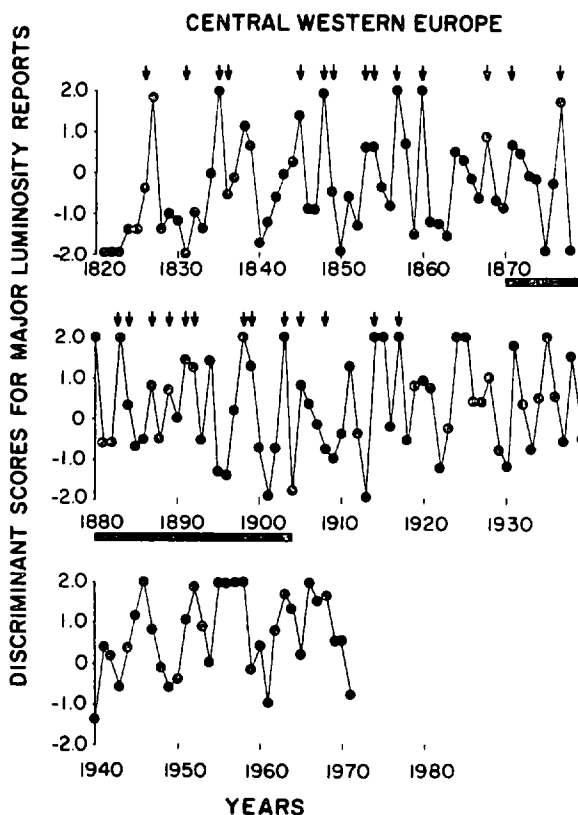


FIG. 1. Predicted discriminant scores for major luminosity reports for the years 1820 to 1971 for Germany, Austria, France, Italy, and Switzerland according to seismic activity within this region and solar variables. The arrows indicate all of the actual reports that were labeled "odd luminosities" within the data pool. Only the years within the heavy line were involved in the calculation of the function.

peak between 1945 and 1946 parallels the so-called foo-fighter episode at the end of World War II.

The most impressive prediction, however, is for the four consecutive years during the mid-fifties. Two of those years demonstrated the most extreme scores ever for the 150-yr. history of the area. Whereas the score for the year 1883 was 3.59, discriminant scores for peak years (in parentheses) between 1950 and 1971 were: 5.84 (1955), 5.38 (1956), 1.92 (1957), 2.65 (1958), and 3.92 (1966). According to the popular literature, these years were also paired with major UFO flaps in the region.

To determine whether these predictions were particular to the function, discriminant scores for peak years from 24 other functions (8 from each period of analysis) were compared. Although the longest period was often associated

with a mean elevation in discriminant score values (that may reflect the reported autocorrelation in SMALLQ numbers), predictions generated from all functions were very similar. The ten top years (maximum to minimum) that were identified by at least 20 of the functions and showed discriminant scores of more than 2.00 were 1956, 1883, 1955, 1966, 1925, 1914, 1931, 1946, 1857 and 1905.

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